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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,946	12/16/2003	Sandeep Shrikant Tonapi	142441 (1306-51)	5520

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GENERAL ELECTRIC COMPANY  
GLOBAL RESEARCH  
PATENT DOCKET RM. BLDG. K1-4A59  
NISKAYUNA, NY 12309

EXAMINER

FEELY, MICHAEL J

ART UNIT	PAPER NUMBER
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1712

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/736,946

Applicant(s)

TONAPI ET AL.

Examiner

Michael J. Feely

Art Unit

1712

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 40 and 46-50 is/are allowed.
- 6) ☒ Claim(s) 1-22, 27-34, 39, 41 and 45 is/are rejected.
- 7) ☒ Claim(s) 23-26, 35-38 and 42-44 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 0404,0505.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Pending Claims***

Claims 1-50 are pending.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-22, 27-34, 39, 41, and 45 are rejected under 35 U.S.C. 102(e) as being anticipated by Rubinsztain et al. (Pub. No.: US 2005/0049334).

The applied reference has a common assignee with the instant application; however, the inventive entity is different. Based upon the earlier effective U.S. filing date of the reference, it

Art Unit: 1712

constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

Regarding claims 1-22, 27, and 28, Rubinsztain et al. disclose: *(1)* an underfill composition comprising: a first curable transparent resin composition comprising an aromatic epoxy resin (paragraphs 0005 and 0047) in combination with a solvent (paragraph 0005), a functionalized colloidal silica dispersion (paragraph 0005), and at least one other component selected from the group consisting of cycloaliphatic epoxy monomers, aliphatic epoxy monomers, hydroxy aromatic compounds and combinations and mixtures thereof (paragraphs 0010-0021 *see last three lines of paragraph 0021*);

*(2)* wherein the first curable resin further comprises at least one resin selected from the group consisting of *see claim for list* (paragraphs 0010-0021);

*(3)* wherein the first curable transparent resin further comprises at least one silicone-epoxy resin (paragraphs 0014-0021);

*(4)* wherein the aromatic epoxy resin is a cresol novolac epoxy (paragraph 0011);

*(5)* wherein the cycloaliphatic monomer is selected from the group consisting of *see claim for list* (paragraph 0013);

*(6)* wherein the aliphatic epoxy monomer is selected from the group consisting of *see claim for list* (paragraph 0013);

Art Unit: 1712

(7) wherein the colloidal silica has a particle size of between about 20 nm and about 100 nm (paragraph 0023); (8) wherein the colloidal silica has a particle size of between about 50 and about 75 nm (paragraph 0023);

(9) further comprising at least one resin hardener (paragraph 0036); (10) wherein the hardener is selected from the group consisting of phenol novolac resin hardeners, hydroquinone, resorcinol, and combinations and mixtures thereof (paragraph 0036);

(11) wherein the at least one solvent is selected from the group consisting of 1-methoxy-2-propanol, butyl acetate, methoxyethyl ether, methoxy propanol acetate and methanol (paragraph 0022);

(12) wherein the colloidal silica is functionalized with at least one organoalkoxysilane (paragraph 0024); (13) wherein the colloidal silica is functionalized with phenyl trimethoxysilane (paragraph 0025); (14) wherein the colloidal silica is end capped by a silylating agent (paragraph 0035); (15) wherein the silylating agent is hexamethyldisilazane (paragraph 0035);

(16) wherein the filler of colloidal silica further comprises silicon dioxide in an amount ranging from about 15 weight percent to about 75 weight percent of the composition (paragraph 0033);

(17) further comprising a catalyst selected from the group consisting of triphenyl phosphine, N-methylimidazole, and butyl tin dilaurate (paragraph 0041);

(18) wherein the first curable transparent resin composition further comprises additives selected from the group consisting of flame retardants, adhesion promoters, reactive organic

Art Unit: 1712

diluents, curing agents, and combinations thereof (paragraphs 0044-0046); **(19)** wherein said reactive organic diluent comprises a monofunctional epoxy (paragraph 0044);

**(20)** wherein the at least one epoxy resin is selected from the group consisting of *see claim for list* (paragraphs 0011 and 0013);

**(21)** further comprising at least one epoxy hardener (paragraph 0036); **(22)** wherein the hardener is selected from the group consisting of amine epoxy hardeners, phenolic resins, carboxylic acid-anhydrides, novolac hardeners, and di-functional siloxane anhydrides (paragraph 0036);

**(27)** further comprising a colloidal silica dispersion functionalized with at least one organoalkoxysilane (paragraph 0024); and **(28)** wherein the colloidal silica has a particle size of between about 5 nm and about 200 nm (paragraph 0023).

\*Rubinsztain et al. do not explicitly disclose “a second curable fluxing composition;” however, nothing distinguishes this composition from the “first composition”. Hence, the limitations are satisfied because the “first” and “second” compositions overlap in scope with nothing distinguishing them from one another. They can be one in the same because Rubinsztain et al disclose a self-fluxing composition.

Regarding claims 29-34 and 39, Rubinsztain et al. disclose: **(29)** an underfill composition comprising: a first curable transparent resin composition comprising an aromatic epoxy resin (paragraphs 0005 and 0047) in combination with a solvent (paragraph 0005), a functionalized colloidal silica dispersion (paragraph 0005) having a particle size of about 50 nm to about 100 nm (paragraph 0023), and at least one other component selected from the group consisting of

Art Unit: 1712

cycloaliphatic epoxy monomers, aliphatic epoxy monomers, hydroxy aromatic compounds and combinations and mixtures thereof (paragraphs 0010-0021 *see last three lines of paragraph 0021*);

(30) wherein the aromatic epoxy resin is a cresol novolac epoxy (paragraph 0011); (31) further comprising a novolac hardeners (paragraph 0036);

(32) wherein the at least one solvent is selected form the group consisting of 1-methoxy-2-propanol (paragraph 0022);

(33) further comprising a catalyst selected from the group consisting of triphenyl phosphine, N-methylimidazole, and butyl tin dilaurate (paragraph 0041);

(34) wherein the filler of colloidal silica further comprises silicon dioxide in an amount ranging from about 15 weight percent to about 75 weight percent of the composition (paragraph 0033); and

(39) wherein the colloidal silica has a particle size of between about 5 nm and about 200 nm (paragraph 0023), wherein said colloidal silica is functionalized with at lest one organoalkoxysilane (paragraph 0024).

\*Rubinsztain et al. do not explicitly disclose “a second curable fluxing composition;” however, nothing distinguishes this composition from the “first composition”. Hence, the limitations are satisfied because the “first” and “second” compositions overlap in scope with nothing distinguishing them from one another. They can be one in the same because Rubinsztain et al disclose a self-fluxing composition.

Regarding claims 41 and 45, Rubinsztain et al. disclose: (41) a solid state device comprising: a chip, a substrate, and an underfill composition between the chip and substrate

Art Unit: 1712

(paragraph 0056) comprising a first curable transparent resin composition comprising an aromatic epoxy resin (paragraphs 0005 and 0047) in combination with a solvent (paragraph 0005), a functionalized colloidal silica dispersion (paragraph 0005) having a particle size of about 50 nm to about 100 nm (paragraph 0023), and at least one other component selected from the group consisting of cycloaliphatic epoxy monomers, aliphatic epoxy monomers, hydroxy aromatic compounds and combinations and mixtures thereof (paragraphs 0010-0021 *see last three lines of paragraph 0021*); and

(45) wherein the transparent underfill composition further comprises additives selected from the group consisting of resin hardeners, resin catalyst, flame retardants, adhesion promoters, reactive organic diluents, curing agents, and combinations thereof (paragraphs 0036-0046).

\*Rubinsztain et al. do not explicitly disclose “a second curable fluxing composition;” however, nothing distinguishes this composition from the “first composition”. Hence, the limitations are satisfied because the “first” and “second” compositions overlap in scope with nothing distinguishing them from one another. They can be one in the same because Rubinsztain et al disclose a self-fluxing composition.

***Allowable Subject Matter***

3. Claims 40 and 46-50 are allowed.
4. Claims 23-26, 35-38, and 42-44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.



*Communication*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Feely whose telephone number is 571-272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael J. Feely  
Primary Examiner  
Art Unit 1712

August 22, 2005